

AI Evaluation Documentation

(1) Introduction

Project is written using **Python** and ran in **Google Colab** due to free GPU usage.

Staff detection and tracking algorithm used **YOLOv8 Small Model** as network structure. GPU memory used is around 1.3GB. The detection and tracking of each frame consume around 15ms, hence the real-time tracking is achieved.

I extract all frames from the sample.mp4 and get 1341 images. Images with staff wearing staff tag are manually chosen. Here are some examples of images I chose to include into the dataset.



I used **Roboflow** to annotate the location of staff. Due to insufficient amount of data given, **data augmentation** techniques such as Saturation, Hue, Exposure, Brightness, Rotation, Blur, Noise, Shear are applied to whole picture and bounding boxes, which are the location of staff. The train dataset contains 828 images and validation dataset contains 223 images. Images are resized to 640*640 to adapt YOLOv8.

(2) Notes

The folder of dataset is "Staff_Dataset". The dataset, video and notebook should be uploaded to `/content/drive/MyDrive/Colab Notebooks/`

The notebook should grant access to your own Google Drive to get dataset and save data into Google Drive.

Necessary modules should be installed before the model is trained.

```
import tensorflow as tf
tf.test.gpu_device_name()
```

The GPU access to notebook can be confirmed by running the code above. Go to 'Edit – Notebook Settings' to change the hardware accelerator to GPU if GPU is not connected.

Before the model is trained, model epoch and batch are able to change through these lines of code. **model_name** is required for log directory in Google Drive.

```
# Load default YOLO model.
model = YOLO('yolov8s.pt') # pretrained model, can change to
nano, large, huge etc.
model_epoch = 50 # change training epoch
model_batch = 4 # change training batch
model_name = 'yolov8s_staff' + "_epoch_" + str(model_epoch) +
"_batch_" + str(model_batch) + "_" + str_current_datetime
```

After the model is trained, the log and model are saved into:

```
"/content/drive/MyDrive/Colab Notebooks/log/" + model_name +
"/train"
```

The model will be saved to "weights" directory. "best.pt" is used as the model trained by the dataset. The model can be exported to "weights" directory by executing the final part of code.

Before the staff tracking is done, the video should be uploaded to Google Drive. **video_path should be changed to the video directory in Google Drive.**

following codes are executed. First track mode code is executed to get the real-time tracking effect. The video with tracking is saved into:

```
"/content/drive/MyDrive/Colab Notebooks/log/" + model_name +
"/video"
```

Second track mode code is executed to get the coordinates of staff in every frame. The coordinates of staff are calculated by using the coordinates of points in bounding box on top left corner and bottom right corner. Every frame in the video with bounding box and other info are saved into:

```
"/content/drive/MyDrive/Colab Notebooks/log/" + model_name +
"/frame"
```

In this directory, **"staff_frame.txt"** records the frames that contains staff.